# Chapter 4: Affected Environment

This chapter provides an overview of the physical, biological and socio-economic features of the 21 counties specific to the Karner blue butterfly's documented range. The information presented is similar to that in Part A of Chapter II, but specific to the documented range, rather than statewide. The documented range is made up of parts of Adams, Barron, Burnett, Chippewa, Clark, Dunn, Eau Claire, Green Lake, Jackson, Juneau, Marquette, Menominee, Monroe, Oconto, Outagamie, Polk, Portage, Shawano, Waupaca, Waushara and Wood counties (Figure 2.10, page 56).

Incidental take of Karner blue butterflies will not occur outside the documented range, since Karner blue butterflies occur only within the documented range. Because of this, the description of the affected environment and the associated impact analyses are restricted to the documented range. In addition, activities in the counties that constitute the documented range present the greatest opportunities for Karner blue butterfly habitat conservation and are the areas most subject to activities being conducted as part of the HCP.

The chapter is divided into three parts discussing:

- the affected physical environment,
- the affected biological environment, and
- the affected socio-economic environment.

## A. Affected Physical Environment

This section provides information on the principle physical features of the documented range. Information for this section was taken primarily from the *Geology of Wisconsin and Upper Michigan* (Paull and Paull 1977) and the *Physical Geography of Wisconsin* (Martin 1965).

### 1. Geology and Soils

Because most of these counties lie along the "tension zone," where most plant and animal species reach the limit of their ranges as described in the state overview, there are no uniform characteristics that depict the entire area. Referring to the physical provinces shown in Figure 2.1 (page 16), counties in the documented range fall primarily within and constitute the Central

Plain. Some of the documented range, however, extends up into the Northern Highland province, west into the Western Uplands, and east into the Eastern Ridges and Lowlands as well.

The Central Plain is comprised of all or part of 18 of the 21 counties forming the documented range. As mentioned in Chapter II (pages 15-17), this is the smallest physical province and is entirely within Wisconsin. It is principally developed on Cambrian sandstone, and the sandy soils are generally not well suited for agriculture. Nonetheless, a variety of vegetation is supported; this includes timberland, oak and jack pine barrens, and, in some areas, bogs (Paull and Paull 1977).

After the Central Plain, the most significant province represented in the documented Karner blue butterfly range is the Northern Highland. Portions of 10 of the 21 counties fall within this physical province. As the southern most extension of the Canadian Shield, this upland consists of igneous and metamorphic rocks with a cover of glacial deposits. With the exception of dairying, agriculture in this province is limited by a short growing season, generally poor soils, irregular topography and the amount of water cover (Martin 1965, Paull and Paull 1977).

## 2. Topography and Drainage

As its name indicates, the topography of the Central Plain is flat or slightly rolling. It reflects differences in Pleistocene history within the area. In the Driftless Area, steep sided sandstone mesas and buttes (castellated mounds) are concentrated in parts of Adams, Jackson, Juneau, Portage and Wood Counties. In contrast to this unglaciated part of the province, the remainder lacks castellated mounds and has a rolling cover of ground moraine, sandy outwash and clay-rich deposits (Paull and Paull 1977).

The Karner blue butterfly documented range primarily overlies all or part of seven of the state's major drainage basins (Fig. 2.2., page 19). These are the St. Croix, Lower Chippewa River, Black River, Lower Wisconsin River, Upper Wisconsin River, Upper Fox River and Wolf River. The Wisconsin River is the largest and most significant drainage feature in the Central Plain. Its route is characterized by a gentle grade and few tributaries. The Wisconsin River has hydroelectric plants along the Juneau and Adams county line that form the large Castle Rock and Petenwell flowages.

Since this area was traversed by multiple lobes from at least two major centers of ice accumulation, the Northern Highland has a complex glacial history. Glacial fingers moved from the north, northwest and northeast out of what are now the Lake Superior and Lake Michigan basins. Early Wisconsin (Altonian) ice advanced as far south as Clark, Wood and northern Marathon counties. This area is better drained and less rugged than regions further north and has the best farmland in the Northern Highland (Paull and Paull 1977).

The Northern Highland is the headwaters region for the major river systems of Wisconsin. From a center near Land O' Lakes, Wisconsin, rivers flow south, southwest, southeast and north. Tributaries of the St Croix, Flambeau-Chippewa and the Wisconsin rivers flow to the Mississippi River. The Escanaba, Menominee, Pehtigo, Oconto and the Fox-Wolf rivers flow to either Green Bay or Lake Michigan, and a series of short streams follow simple routes north to Lake Superior (Martin 1965, Paull and Paull 1977).

### 3. Water Quality

General information on water quality for each of the seven basins mentioned above was obtained from the respective basin water quality management plans prepared by the DNR (i.e. Koperski 1996; Bougie, *et al.* 1996; Kreitlow, *et al.* 1997; Fix 1994; Malischke, *et al.* 1994; Kreitlow 1992; Sorge 1992; and Fix and Eagan 1990). Water quality is described as generally good within the documented range. Many of the watersheds within the basins, however, lack current or base-level data, making assessment difficult.

Nonpoint source pollution is prevalent throughout the affected environment and is the predominant threat to water quality. In the south and central portions of the documented range, nonpoint pollution results primarily from agricultural practices. Sources of water contamination from agriculture include streambank pasturing, barnyard or exercise runoff, streambank erosion and cropland erosion. Livestock grazing along streams causes erosion, as well as ammonia and phosphorus contributions from livestock waste and elevated water temperatures; this can cause severe impacts to fish and other aquatic life (Turville-Heitz 1994).

In the northern reaches, however, the effects of forestry practices are one of the principal contributors to water quality degradation (Turville-Heitz 1994). Streambank erosion, polluted runoff and elevated water temperatures are among the principal concerns. As with those associated with unmodified agricultural practices, these problems can have injurious effects on the health of streams. Best management practices are helping to reduce concerns.

Another commonly noted problem in preserving water quality is the presence of impoundments. Because of slowed current and nutrient loss from upstream, both natural and anthropogenic impoundments can cause higher nutrient concentrations and rates of sedimentation. Beaver dams were noted as an issue of concern in many watersheds within the basins. Furthermore, many hydroelectric dams operate within the documented range.

### 4. Climate and Weather

In refining the Karner blue butterfly documented range map, the HCP Biological Team established criteria for habitat based on climate data (see Part B of Chapter II, pages 52-56). Factors that were considered included the average date of the first autumn frost, which ranged between September 21-30; the average date of the last spring frost, which ranged between May 6-25; the average length of the growing season, which ranged from 115-154 days; the average maximum temperature from May 16 to June 15, which ranged from 71-75 degrees; the average maximum temperature from June 16 to July 15, which ranged from 75-81 degrees; and the average maximum temperature from July 16 to August 15, which ranged from 77-81 degrees.

### 5. Air Quality

Air Quality in the Karner blue butterfly documented range is generally good. All 21 counties included in the documented range are in attainment of the National Ambient Air Quality Standards. These standards require the monitoring of six primary contaminants to air quality: sulfur dioxide, carbon monoxide, nitrogen oxides, lead, particulate matter and volatile organic compounds (VOCs).

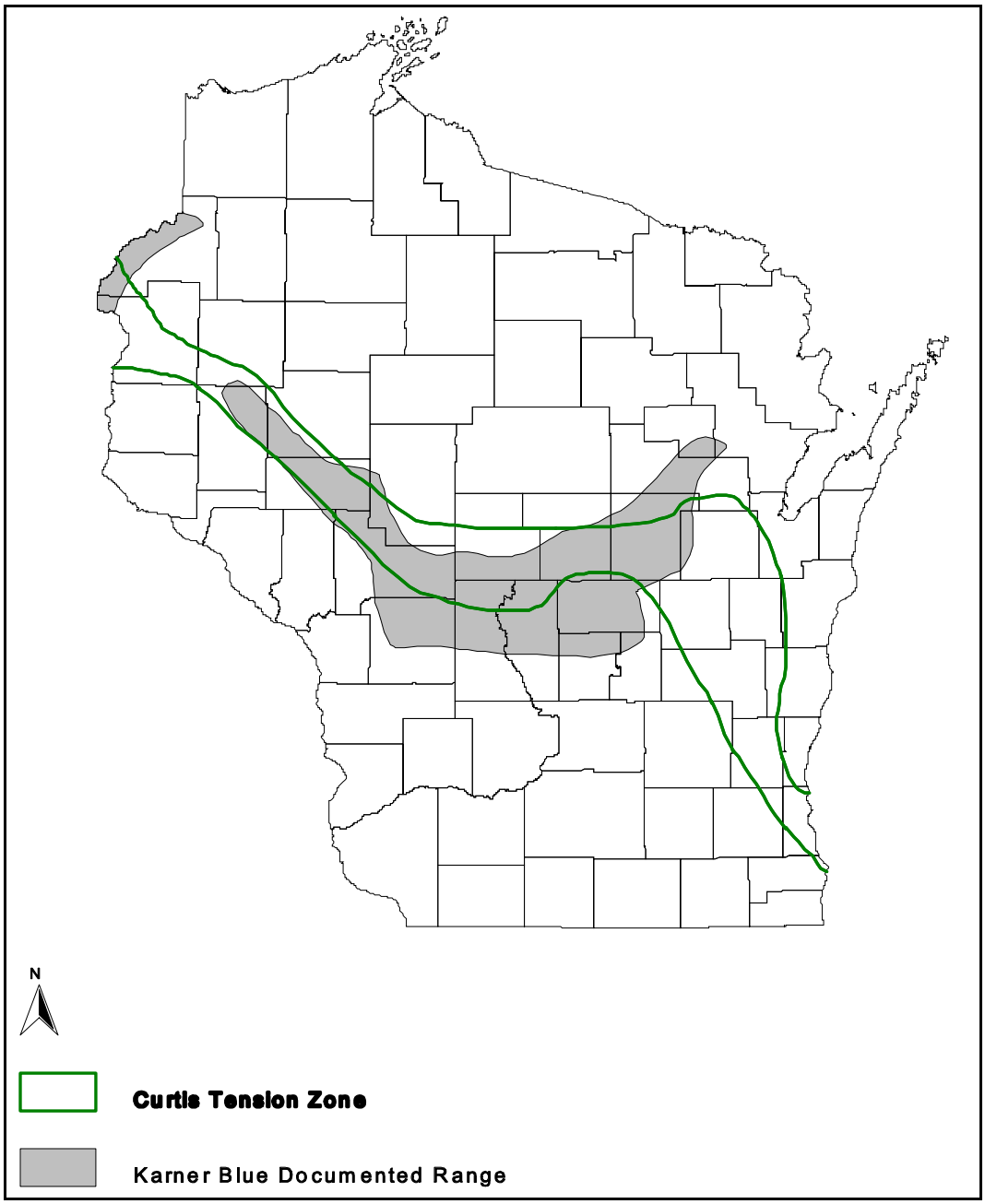
## B. Affected Biological Environment

Part A of Chapter II (pages 20-23) and the report *Wisconsin's Biodiversity as a Management Issue* provide an overview of the plant communities found in Wisconsin. This part of Chapter II provides information specific to natural and artificial barrens communities, since the Karner blue butterfly is found in these ecosystems, and several partners have chosen to manage comprehensively for barrens. This part also discusses federally- and state-listed species, as well as species associated with Karner blue butterfly habitats.

### 1. Plant Communities

Most of the counties included in the documented range lie along the "tension zone" described by Curtis (1959) (Figure 4.1, page 249). Most plant and animal species reach the limits of their ranges in this area. As such, there are no uniform characteristics that depict the entire area. Rather, the area is typified by a mix of both northern and southern species.

**Figure 4.1. Location of the Tension Zone (Adapted from Curtis 1959) with the Karner Blue Butterfly Documented Range**



## 2. Natural Barrens Communities

Barrens are plant communities that occur on sandy soils and are dominated by grasses, low shrubs, small trees and scattered large trees. Typically, these areas contain jack pine (*Pinus banksiana*), red pine (*P. resinosa*) , or Hill's oak (*Quercus ellipsoidalis*) as the dominant trees and average less than full canopy closure. These communities have a diverse mix of tree diameters and heights with several successional stages present. Shrub layer and ground layer vegetation includes sweet ferns (*Comptonia peregrina*), hazel (*Corylus* spp.), blueberry (*Vaccinium* spp.), bracken fern (*Pteridium aquilinum*), reindeer lichens (*Cladonia* spp.), Pennsylvania sedge (*Carex pensylvanica*), blue-stem grasses (*Andropogon* spp.) and many other species.

Curtis (1959) described these communities as pine barrens in northern and central Wisconsin and as oak barrens in southern and west-central Wisconsin. Barrens have a dynamic nature and are variable in structural type and species composition. Given this, they are difficult to describe and classify (Eckstein and Moss 1995).

One consistent element of all barrens is the dependence on disturbance and the major role that fire can play in their dynamics. For thousands of years, fires have periodically burned on Wisconsin barrens. Prior to Euro-American settlement, fires were caused by lightning or were set by Native Americans to maintain game habitat, drive game and enhance fruit and berry crops (Eckstein and Moss 1995). The behavior of fire is greatly influenced by topography, weather, vegetation, soil factors, season and time of day. Natural wild fires usually produce a complex mosaic of burned and unburned patches depending on fire intensity, topography, soil moisture and local weather conditions (Niemi and Probst 1990).

Because of the long association with fire, the plants and animals that comprise barrens communities are adapted to periodic disturbance. Vogl (1970) states:

> *The question of whether fire is necessary to maintain northern Wisconsin pine barrens is perhaps not an appropriate question, for all factors including soil type, soil fertility, topography, climate, drought and fire are inseparably linked and operate together in chain reactions and cannot be considered individually. Fire is one of the essential ingredients in pine barrens, but the critical factor in determining the presence of barrens among northern pine-hardwoods forests is not so much fire, but the presence of sandy plains; sites with low fertility that lend themselves to droughts and fires of the proper intensities and frequencies to produce a vegetational structure and composition called barrens.*

Element occurrence data from the Natural Heritage Inventory -- the DNR's integrated system of computer databases, maps and manual files that document the historical and current occurrence of rare plants, animals and natural communities -- indicate that 10,000 acres of pine and oak

barrens remain on 65 sites (Eckstein and Moss 1995). These figures do not include all of the pine and oak barrens remaining in Wisconsin. The most significant omissions are portions of large, managed barrens on county, state and federal lands in northwestern Wisconsin. The Natural Heritage Inventory lists pine barrens as G3 (very rare and local throughout the range or found locally) and oak barrens as G2 (imperiled globally, because of rarity).

Although recently cut pine and oak stands may mimic barrens for a period of time, remaining barrens primarily exist as small, isolated fragments on about a dozen state or federal managed areas. Most of these fragments are too small and isolated to ensure long-term viability of all their characteristic native plant and animal species (Eckstein and Moss 1995). Some larger remnants, however, provide greater opportunities for ecosystem recovery. A few examples are Ft. McCoy in Monroe County, Necedah National Wildlife Refuge in Juneau County, Crex Meadows Wildlife Area in Burnett County and Fish Lake Wildlife Area in Burnett County (Shively and Temple 1994).

For additional information on Wisconsin's barrens communities, readers are referred to Eckstein and Moss (1995), Mossman, *et al.* (1991) and Curtis (1959).

### 3. Artificial Barrens Communities

Although the Karner blue butterfly is associated with the barrens landscape, it is not necessarily particular to it. For instance, some land management practices serve to temporarily mimic aspects of barrens communities. As natural habitats within the state have been increasingly altered by man, the Karner blue butterfly has been able to acclimate to managed forest lands, road and utility corridors and fallow agricultural fields.

Managed forests often provide early successional habitat that can be readily colonized by lupine, and, ultimately, the Karner blue butterfly. Usually, in the first 10-15 years after being prepped and planted, a site provides the appropriate characteristics to support lupine and other nectaring plants, which may, in turn, support Karner blue butterflies. Furthermore, forest roads originally established to transport timber products may serve as dispersal corridors for the Karner blue butterfly. This allows them to migrate or expand their populations by colonizing new sites.

Managed easements for roads and utilities also provide mimicked early successional habitat well suited to lupine. This is done both in the creation of new corridors and in the maintenance of existing ones. These activities can reduce canopy cover, providing increased light to herbaceous plants; disturb soil, providing germination sites for lupine seeds; and create corridors, providing means of dispersal between isolated Karner blue butterfly populations (Weaver Boos Consultants 1996).

Karner blue butterfly habitat can also be found on many fallow agricultural fields. Although these

sites, usually scattered and smaller, vary widely in habitat quality, wild lupine is often common to abundant. Non-native forage grasses often have completely replaced native warm-season grasses, and the proportion of weedy and non-native flowering plants can also be quite high. Nevertheless, these fields appear to serve as surrogate prairie or barrens. Such sites are especially common in the eastern portion of the Karner blue butterfly documented range. They also exist, however, on openings that were historical homesteads in the western counties, where forest management is now more prevalent. Agriculture was attempted and abandoned across much of the Central Sands Region where Karner blue butterfly habitat now exists.

## 4. Federally-Listed Species

In addition to the Karner blue butterfly, eight animal and six plant species that are federally-listed as endangered or threatened occur in Wisconsin. In addition, one species proposed for federal listing as threatened, the Canda lynx, occurs in Wisconsin. The status and distribution of each species is briefly discussed below. Several of these species do not occur within the Karner blue butterfly's high potential range (i.e. the "affected environment"), but are included here in an attempt to consider potential impacts on all listed species. Potential impacts to these species are discussed in Chapter V (pages 315-318). *Incidental take of other federally listed species would not be authorized as part of the Karner blue butterfly HCP and ITP.*

### Canada Lynx (*Lynx canadensis*)

*Proposed Threatened.* The Canada lynx was proposed for federal-listing as threatened in the contiguous United States on July 8, 1998 (USFWS 1998b). A resident Canada lynx population has not likely existed in Wisconsin since 1900. The presence of Canada lynx in the states has been associated with the cyclic lynx population fluctuations in Canada (Theil 1987). Very few sitings have been made of Canada lynx in recent years in Wisconsin; with sightings mostly occurring in the northern and northwestern parts of the state. Canada lynx were placed on the state's protected species list in 1957 and classified as state endangered in 1972 (USFWS 1998b). In 1997, Canada lynx was removed from the state's threatened species list, as it has not been a current or recent breeder in the state. In 1998, the Canada lynx was added to the state list of protected wild animals (s. NR 10.02, Wis. Adm. Code).

### Timber wolf (*Canis lupus*)

Endangered. About 178-184 wolves in 47 groups exist in Wisconsin (Wydeven and Boles 1998). Average adult mortality is about 20 percent and the population continues to increase (Theil and Wydeven 1996). The Wisconsin wolf range is restricted to Florence, Forest, Lincoln, Oneida, Price, Rusk, Sawyer, Taylor, Iron, Ashland, Bayfield, Douglas, Sawyer, Washburn, Burnett and Polk counties in the north, and Clark, Eau Claire, Jackson, Monroe, Juneau and Wood counties in the central part of the state. As the wolf population increases, this range may expand. Overlap

of the Karner blue butterfly range and that of the timber wolf likely occurs in Burnett, Clark, Jackson and Wood counties.

**Peregrine Falcon (*Falco peregrinus*)**

Endangered. Historically, Peregrine Falcons nested in Wisconsin on cliffs along the Wisconsin and upper Mississippi rivers and in Door County. Between 1965 and 1985, however, no Peregrine Falcons nested in the state (Gieck 1992). Breeding along the Mississippi River by captive-bred Minnesota birds began in 1986 and has continued since. Nesting in the past also occurred at or near release sites in Madison and Milwaukee and at Devil's Lake State Park. Currently, Peregrine Falcons are only known to nest on buildings and bridges in Wisconsin. During 1998, ten nests successfully fledged young. Nests sites were in Milwaukee, Oak Creek, Kenosha, Sheboygan, Manitowoc and Green Bay (Univ. Minnesota 1998)

**Kirtland's Warbler (*Dendroica kirtlandii*)**

Endangered. The Kirtland's Warbler is also known as the Jack Pine Warbler due to its highly specific nesting requirement of jack pine barrens. Jack pine (*Pinus banksiana*) must predominate and be young to middle aged. It has been found only a few times in the state, but only as a nonbreeding species. The Kirtland's Warbler has been found in Jackson, Douglas, Washburn, Vilas, Marinette, and possibly Juneau counties. Historic records indicate presence in other counties during migration.

**Piping Plover (*Charadius melodus*)**

Endangered. Piping plovers are tiny shorebirds that inhabit sandy beaches where vegetation is sparse. In Wisconsin, the only breeding pairs in recent years have occurred along the shores of Lake Superior (Hallowell and Gieck 1987).

**Bald Eagle (*Haliaetus leucocephalus*)**

Threatened. In Wisconsin, bald eagles nest along the shores of inland lakes and rivers, with the largest breeding concentrations in the northern third of the state (Gieck 1991). Bald Eagles have recovered well in Wisconsin (USFWS 1995). During 1998, 689 occupied territories were documented in the state (Jody Millar, Rock Island Ecol. Serv. Field Office, pers. comm.).

**Hine's Emerald Dragonfly (*Somatochlora hineana*)**

Endangered. In Wisconsin, the Hine's Emerald Dragonfly is found only in Door County. Its larvae are restricted to very small groundwater fed seeps, which occur over dolomitic bedrock near the surface. Typically, the larvae are found underneath partially decaying vegetation.

**Higgins' Eye Pearly Mussel (*Lampsilis higginsi*)**

Endangered. The world range of the Higgins' eye pearly mussel is the upper Mississippi River from Prescott, Wisconsin south to Iowa, Illinois and Missouri and larger tributaries, such as the St. Croix and Wisconsin Rivers (Brynildson 1989, Cummings and Mayer 1992).

**Winged Mapleleaf Mussel (*Quadrula fragosa*)**

Endangered. Historically, the winged mapleleaf mussel was found in the Mississippi, Tennessee, Ohio and Cumberland river drainages in at least eleven different states. Today, the winged mapleleaf mussel is restricted to only a small area in the lower St. Croix River (Cummings and Mayer 1992, Lewellyn 1993).

**Northern Monkshood (*Aconitum noveboracense*)**

Threatened. Northern monkshood is restricted to cool, moist, rocky slopes in mixed forests of the Driftless Area (Read 1976). It is often found near seepage springs. Occasionally, the monkshood may be found in sunny areas when it can grow in the shade of a tree such as sugar maple (*Acer saccharum*) or yellow birch (*Betula alleghaniensis*). Other plants that favor the conditions of the Northern monkshood include the Canada mayflower (*Maianthemum canadense*) and the Spinulose wood fern (*Dryopteris carthusiana*). Monkshood is known from only seven sites in the state (Kopitzke, n.d.).

**Prairie Bush Clover (*Lespedeza leptostachya*)**

Threatened. Dry to medium moist prairies with full sun are the preferred habitat of the prairie bush clover. Soils are often gravelly or sandy. Prairie bush clover is thought to require occasional prairie fires to discourage the growth of trees and shrubs that compete with it. Other observations suggest grazing or recent grazing history are more important controls on competition (Ann B. Swengel, pers. comm.). In Wisconsin, prairie bush clover is found in only about six sites in the southern and western parts of the state (Dane, Grant, Pierce, Rock and Sauk counties; Kopitzke, n.d.).

**Dune (Pitcher's) Thistle (*Cirsium pitcheri*)**

Threatened. Dune thistle occurs on sand dunes along the Lake Michigan shoreline in Door, Manitowoc and Sheboygan counties. It generally occurs in the area between an open sandy beach and a fully vegetated dune (Kopitzke, n.d.), and about 60 percent of the existing plants occur on publicly owned land (Brynildson, n.d.). It is found as appropriate openings appear in a slowly changing dynamic dune system.

**Fassett's Locoweed (*Oxytropis campestris* var. *chartacea*)**

Threatened. Gravelly or sandy shores of hard water lakes are the favored habitat of Fassett's locoweed. It is known only from the shores of a few shallow lakes in central Wisconsin, from sites exposed to full sunlight and subject to widely fluctuating water levels (Kopitzke, n.d.; Read 1976). Locoweed apparently benefits from the changing water levels that discourage the growth of trees and shrubs that might otherwise shade it out.

**Dwarf Lake Iris (*Iris lacustris*)**

Threatened. In Wisconsin, the dwarf lake iris is found only in Door and Brown counties in the northeastern part of the state, along the shores of Lake Michigan. It occurs in openings in white cedar and birch forests (Brynildson, n.d.; Kopitzke, n.d.). Dwarf lake iris thrives in cool air from the lakes and the thin, moist, sandy or rocky soil near the shores, a popular area for shoreland development.

**Eastern Prairie Fringed Orchid (*Platanthera leucophaea*)**

Threatened. Eastern prairie fringed orchids occur in deep, fertile, well-watered soils of wet to medium wet prairies. It is also found in wet meadows and bogs. It grows best in full sun (Brynildson, n.d.). The plant is known from about 11 sites in southeastern Wisconsin (Kopitzke, n.d.). Like many wild orchids, eastern prairie fringed orchid can appear some years in large numbers and other years not show itself at all.

## 5. State Listed Species

Wisconsin's endangered and threatened species list currently includes 101 animals (two mammals, 26 birds, one amphibian, nine reptiles, 21 fishes, 20 insects and 22 mollusks) and 138 vascular plants. These species occur in a variety of habitats and occupy a variety of ecological niches. Some of these rare species are associated with Karner blue butterflies or their habitat. These species are discussed in the next section. Some rare species have overlapping ranges with the Karner blue butterfly, but are found in distinctly different habitat types. Other species do not share overlapping ranges with the Karner blue butterfly documented range. Species in these latter two categories are not addressed in this document. State listed species are subject to a consultation process under Wisconsin's endangered species law (see pages 318-321 in Chapter V for more information on this process and the potential effects of HCP implementation on these species, respectively).

Most of the rare species known to occur, or likely to occur over the next ten years, on partner lands within the Karner blue butterfly's high potential range (the documented range and an area of potential habitat surrounding it) are not expected to experience any significant impacts, positive or negative, as a result of implementing this HCP. Typically, this is due to the fact that these species' habitat needs are not associated with Karner blue butterfly, pine/oak barrens or dry, sandy soils. Species falling into this category are listed in Table 4.1 (pages 257-258).

Several of the rare species known to occur, or likely to occur, on partner lands within the high potential range are closely associated with the Karner blue butterfly and are expected to experience similar positive benefits through the implementation of the HCP. As with the Karner blue butterfly, species in this category are dependent upon disturbance of their existing occupied habitat which, although resulting in take of individuals or populations, benefits the species over the long-term. Other species in this category are those for which any take would be limited, both in terms of frequency of occurrence as well as the magnitude of the take. That is, although there will likely be no positive benefit to the species, any take will be not be substantial and is not expected to result in any long-term harm to the species distribution or status in the state. Species falling into this second category are listed in Table 5.2 (page 321).

## 6. Species Associated with Karner Blue Butterflies

Tables 4.2-4.4 list rare species associated with Karner blue butterfly and a variety of habitats in which they occur. Additional information on species highlighted in boldface text is included in Appendix B.

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**Key to status symbols used in Tables 4.2 - 4.4 (Pages 259-263)**

SC = special concern
End = endangered
Thr = threatened
FSC = federal species of concern

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## Table 4.1. State Listed Species for which HCP Implementation is Expected to Result in Neither Significant Positive or Negative Effects

**Plants**

American beakgrain
Brook grass
Early anemone
Fassett's locoweed
Reticulated nutrush
Soft-leaf muhly
Spotted pondweed
Tussock bullrush
Bog bluegrass
Drooping sedge
Fairy slipper
Large water-starwort
Long-beaked baldrush
Marsh valerian
Musk-root
Northern wild monkshood
Pale green orchid
Small white lady's-slipper
Snow trillium
Sticky false-asphodel
False hop sedge
Hairy fimbristylis
Heart-leaved foam-flower
Heart-leaved plantain
Lapland azalea
Little goblin moonwort
Smooth phlox
Wolf spikerush
American fever-few
Arrow-leaved sweet-coltsfoot
Beaked spikerush
Buckhorn
Carey's sedge
Cliff cudweed
Forked aster
Round-leaved orchis
Seaside corwfoot
Snowy campion
Squarestem spikerush
Bog bluegrass
Spotted pondweed
Squashberry
Canada gooseberry
Lake-cress
Algae-like pondweed
Dwarf umbrella sedge

**Invertebrates**

Giant carrion beetle
Northern blue butterfly
Snuffbox
Warpaint emerald
Winged mapleleaf
Pygmy snaketail
Salamander mussel
Slippershell mussel
Flat-headed mayfly
Ebony shell
Higgin's eye pearly mussel
Pacatonica River mayfly
Silphium borer moth
Slough sandshell
Swamp metalmark
Yellow sandshell
Monkeyface
Rock pocketbook
Wartyback
Ellipse
Wing snaggletooth
Spatterdock darner
Extra-striped snaketail

**Table continues on next page.**

## Table 4.1. State Listed Species for which HCP Implementation is Expected to Result in Neither Significant Positive or Negative Effects, Cont.

**Fishes**

Crystal darter
Goldeye
Blue sucker
Gilt darter
Greater redhorse
Longear sunfish
Ozark minnow
Paddlefish
Pugnose shiner
Redfin shiner
River redhorse
Speckled chub
Bullhead
Pallid shiner
Slender madtom
Starhead topminnow
Striped shiner
Black buffalo
Creek chubsucker
Weed shiner

**Amphibians and Reptiles**

Blanchard's cricket frog
Queen snake
Blanding's turtle
Northern ribbon snake
Western ribbon snake
Butler's garter snake

**Birds**

Barn owl
Common tern
Forster's tern
Red-necked grebe
Trumpeter swan
Great egret
Osprey
Yellow rail
Caspian tern
Piping plover
Yellow-crowned night heron

## Table 4.2. Rare Vertebrate Species Associated with Karner Blue Butterflies in Wisconsin (Based on 1996 revisions to Natural Heritage Inventory Working List and work of the HCP Biological Team.)

*(See key to status categories on page 256)*

| Scientific Name, Common Name | State Status | Fed. Status |
|---|---|---|
| **Rare Birds** | | |
| *Ammodramus henslowii*, Henslow's sparrow | SC | FSC |
| *A. savannarum*, grasshopper sparrow | SC | none |
| *Bartramia longicauda*, upland sandpiper | SC | none |
| *Chondestes grammacus*, lark sparrow | SC | none |
| ***Dendroica kirtlandii*, Kirtland's warbler** | **SC** | **End** |
| *Dolichonyx oryzivorus*, bobolink | SC | none |
| *Icterus spurius*, orchard oriole | SC | none |
| ***Lanius ludovicianus*, loggerhead shrike** | **End** | **FSC** |
| *Oporornis agilis*, Conneticut warbler | SC | none |
| ***Pedioecetes phasianellus*, sharp-tailed grouse** | **SC** | **none** |
| *Pooecetes gramineus*, vesper sparrow | SC | none |
| *Spiza americana*, dickcissel | SC | none |
| *Spizella pusilla*, field sparrow | SC | none |
| *Sturnella neglecta*, western meadowlark | SC | none |
| *Tympanuchus cupido*, greater prairie-chicken | Thr | none |
| *Tyrannus verticalis*, western kingbird | SC | none |
| *Tyto alba*, barn owl | End | none |
| *Vermivora peregrina*, Tennessee warbler | SC | none |
| *Vireo bellii*, Bell's vireo | Thr | none |
| **Rare Reptiles & Amphibians** | | |
| *Crotalus horridus*, timber rattlesnake | SC | none |
| ***Ophisaurus attenuatus*, western slender glass lizard** | **End** | **none** |
| *Pituophis melanoleucus*, bull snake | SC | none |
| ***Sistrurus catenatus catenatus*, eastern massasauga** | **End** | **FSC** |
| *Terrapene ornata*, ornate box turtle | End | none |
| ***Clemmys insculpta* #, wood turtle** | **Thr** | **none** |
| ***Emydoidea blandingii* #, Blanding's turtle** | **Thr** | **FSC** |

**Bold** = Species for which additional information has been included in Appendix B.

## Table 4.3. Rare Invertebrate Species Associated with Karner Blue Butterflies in Wisconsin (Based on 1996 revisions to Natural Heritage Inventory Working List and work of the HCP Biological Team.)

*(See key to status categories on page 256)*

| Scientific Name, Common Name | State Status | Fed. Status |
|---|---|---|
| *Aeropedellus clavatus*, club-horned grasshopper | SC | none |
| ***Aflexia rubranura*, red-veined prairie leafhopper** | **SC** | **FSC** |
| ***Atrytonopsis hianna*, dusted skipper** | **SC** | **none** |
| ***Chlosyne gorgone carlota*, Gorgone checker spot** | **SC** | **none** |
| ***Cicindela patruela patruela,* a tiger beetle** | **SC** | **none** |
| ***C. p. huberi*, a tiger beetle** | **SC** | **none** |
| *Cicindela splendida*, a tiger beetle | SC | none |
| *Eritettix simplex*, velvet-striped grasshopper | SC | none |
| *Everes amyntula*, western tailed blue | SC | none |
| *Erynnis baptisiae*, wild indigo dusky wing | SC | none |
| ***E. martialis*, mottled dusky wing** | **SC** | **none** |
| ***E. persius persius*, Persius dusky wing** | **SC** | **none** |
| *Euchlaenia milnei*, a looper moth | SC | FSC |
| *Gastrocopta procera*, wing snaggletooth snail | Thr | none |
| *Grammia phyllira*, Phyllira tiger moth | SC | none |
| *G. oithona*, Oithona tiger moth | SC | none |
| *Hemileuca nevadensis*, buck moth | SC | none |
| *Hesperia comma*, Laurentian skipper | SC | none |
| *H. ottoe*, ottoe skipper | SC | none |
| ***H. leonardus leonardus*, Leonard's skipper** | **SC** | **none** |
| *H. leonardus/pawnee*, Leonard/Pawnee blend | SC | none |
| ***H. metea*, cobweb skipper** | **SC** | **none** |
| *Hesperotettix speciosus*, a grasshopper | SC | none |
| ***Incisalia henrici*, Henry's elfin butterfly** | **SC** | **none** |
| ***I. irus*, frosted elfin butterfly** | **Thr** | **none** |
| *Lycaeides idas nabokovi*, northern blue butterfly | End | none |
| *L. melissa samuelis*, Karner blue butterfly | SC | End |
| *Megacephala virginica*, Virginia big-headed tiger beetle | SC | none |
| *Melanoplus flavidus*, blue-legged grasshopper | SC | none |
| *M. obovatipennis*, obovate-winged grasshopper | SC | none |
| *Oeneis chryxus strigulosa*, chryxus arctic butterfly | SC | none |
| *Pardalophora phoenicoptera*, orange-winged grasshopper | SC | none |
| *Phoetaliotes nebrascensis*, large-headed grasshopper | SC | none |
| ***Phyciodes batesii*, tawny crescent spot** | **SC** | **FSC** |

**Table continues on next page.**

## Table 4.3. Rare Invertebrate Species Associated with Karner Blue Butterflies in Wisconsin, Cont.

| Scientific Name, Common Name | State Status | Fed. Status |
|---|---|---|
| *Phytometra ernestinana*, Ernestine's moth | SC | none |
| *Polyamia dilata*, a prairie leafhopper | SC | none |
| *Psinidia fenestralis*, long-horned grasshopper | SC | none |
| *Spharagemon marmorata*, northern marbled locust | SC | none |
| ***Schinia indiana*, phlox flower moth** | **End** | **FSC** |
| *Speyeria idalia*, regal fritillary | End | FSC |
| *Tachysphex pechumani*, a sand-loving wasp | SC | none |
| *Trachyrhachis kiowa*, ash-brown grasshopper | SC | none |
| *Trimerotropis maritima*, seaside grasshopper | SC | none |

**Bold** = Species for which additional information has been included in Appendix B.

## Table 4.4. Rare Vascular Plant Species Associated with Karner Blue Butterflies in Wisconsin (Based on 1996 revisions to Natural Heritage Inventory Working List and work of the HCP Biological Team.)

(See key to status categories on page 256)

| Scientific Name, Common Name | State Status | Fed. Status |
|---|---|---|
| ~~*Agalinis gattingeri*, round-stemmed false foxglove~~ | ~~Thr~~ | ~~none~~ |
| *A. skinneriana*, pale false foxglove | End | FSC |
| *Agastache nepetoides*, yellow giant hyssop | Thr | none |
| *Anemone caroliniana*, Carolina anemone | End | none |
| *Anemone multifida var hudsoniana*, Hudson Bay anemone | End | none |
| *Aristida dichotoma*, poverty grass | SC | none |
| *Artemisia dracunculus*, dragon sagewort | SC | none |
| *A. frigida*, prairie sagewort | SC | none |
| *Asclepias lanuginosa*, wooly milkweed | Thr | none |
| ***A. ovalifolia***, oval milkweed | PThr | |
| *A. purpurascens*, purple milkweed | End | none |
| *Astragalus crassicarpus*, prairie plum | End | none |
| *Besseya bullii*, kitten tails | Thr | none-former c3 |
| *Botrychium rugulosum*, ternate grape fern | SC | none |
| *Cacalia tuberosa*, prairie indian plantain | Thr | none |
| *Calylophus serrulatus*, toothed evening primrose | SC | none |
| *Carex richardsonii*, Richardson sedge | SC | none |
| *Cirsium flodmanii*, Flodman's thistle | SC | none |
| *Cirsium hillii*, prairie thistle | Thr | FSC |
| *Dalea villosa*, villous prairie clover | SC | none |
| *Diodia teres var teres*, buttonweed | SC | none |
| *Eupatorium sessilifolium* var. *brittonianum*, upland boneset | SC | none |
| *Gentiana alba*, yellowish gentian | Thr | none |
| *Lespedeza leptostachya*, prairie bush clover | End | Thr |
| *L. virginica*, slender bush clover | Thr | none |
| *Leucophysalis grandiflora*, white ground cherry | SC | none |
| *Liatris punctata* var. *nebraskana*, dotted blazing star | End | none |
| *L. spicata*, marsh blazing star | SC | none |
| *Minuartia dawsonensis*, northern rock sandwort | SC | none |
| *Nothocalais cuspidata*, prairie dandelion | SC | none |
| *Ophioglossum vulgatum* var. *pseudopodum*, adder's tongue | SC | none |
| *Opuntia fragilis*, brittle prickly pear | Thr | none |
| *Orobanche ludoviciana*, Louisiana broomrape | SC | none |
| *O. uniflora*, one-flowered broomrape | SC | none |
| *O. fasciculata*, clustered broomrape | Thr | none |

**Table continues on next page.**

## Table 4.4. Rare Vascular Plant Species Associated with Karner Blue Butterflies in Wisconsin, Cont.

| Scientific Name, Common Name | State Status | Fed. Status |
|---|---|---|
| *Parthenium integrifolium*, wild quinine | Thr | none |
| *Penstemon pallidus*, pale beardtongue | SC | none |
| *Phlox bifida*, cleft phlox | SC | none |
| *Polygala incarnata*, pink milkwort | End | none |
| *Prenanthes aspera*, rough white lettuce | End | none |
| *Rhamnus lanceolata* var. *glabrata*, lance-leaved buckthorn | SC | none |
| *Rhus aromatica*, fragrant sumac | SC | none |
| *Ruellia humilis*, wild petunia | End | none |
| *Scutellaria parvula* var.*parvula*, small skullcap | End | none |
| *Solidago sciaphila*, cliff goldenrod | SC | none |
| ***Talinum rugospermum*, prairie fame-flower** | **SC** | **FSC** |
| *Thaspium barbinode*, hairy meadow parsnip | End | none |
| *T. trifoliatum var flavum*, meadow parsnip | SC | none |
| *Tomanthera auriculata*, eared false foxglove | SC | FSC |
| *Vaccinium caespitosum*, dwarf bilberry | End | none |
| ***Viola fimbriatula*, sand violet** | **End** | **none** |

**Bold** = Species for which additional information has been included in Appendix B.

## C. Socio-economic Environment

This part of Chapter IV provides an overview of the socio-economic features of the 21 counties included in the Karner blue butterfly documented range.

### 1. Human Population and Housing

Information for this section was drawn primarily from the U.S. Census of Population and Housing.

**Population.** As seen in Table 4.5 (page 265), population in the counties that make up the Karner blue butterfly documented range has generally been increasing. With the exception of Clark and Jackson Counties, showing a 1.4 percent and 3.8 percent decrease in population respectively, the counties in the range showed an increase for the period 1980-1990. Adams County grew the fastest relative to its base population during this period, increasing its population by 16.56 percent with 2,225 new persons. Outagamie added the largest total number of people, with 11,780 new residents in the 10 year period.

Urban areas in the documented range were also compared (see Table 4.5, page 265); Plover, in Portage County, had the greatest relative change in population, increasing over 50 percent. Altoona in Eau Claire County had a dramatic percentage increase as well. As one of the largest urban centers in the region, Eau Claire showed the largest gross rise in population, with an increase of 5,328 persons in the ten year period.

**Distribution.** The counties that form the Karner blue butterfly documented range are predominantly rural. Several counties, such as Adams, Burnett, Marquette and Menominee, have none of their population classified as urban (see Table 4.5, page 265). In contrast, Eau Claire County has over 74 percent of its population residing in urban areas, and Outagamie County has nearly 73 percent. Monroe, Portage and Wood Counties also have significant urban populations of 40 percent or more.

## Table 4.5. Population and Housing Units in the Documented Karner Blue Butterfly Range (U.S. Census of Population and Housing)

| | Population | | | | Housing Units | | |
|---|---|---|---|---|---|---|---|
| | 1980 | 1990 | | Change | 1980 | 1990 | Change |
| | Total | Urban | Total | 1980-1990 | Total | Total | 1980 |
| Adams | 13,457 | 0 | 15,682 | 16.53% | 26,186 | 28,839 | 10.13% |
| Barron | 38,730 | 10,984 | 40,750 | 5.21% | 17,153 | 19,363 | 12.88% |
| Burnett | 12,340 | 0 | 13,084 | 6.02% | 10,359 | 11,743 | 13.36% |
| Chippewa | 52,127 | 20,023 | 52,360 | .44% | 19,203 | 21,024 | 9.48% |
| Clark | 32,910 | 2,670 | 31,647 | -3.83% | 12,384 | 12,904 | 4.19% |
| Dunn | 34,314 | 13,547 | 35,909 | 4,64% | 11,886 | 13,252 | 11.49% |
| Eau Claire | 78,805 | 63,534 | 85,183 | 8.09% | 28,973 | 32,741 | 13.0% |
| Green Lake | 18,370 | 5,304 | 18,651 | 1.52% | 8,319 | 9,202 | 10.61% |
| Jackson | 16,831 | 3,490 | 16,588 | -1.44% | 6,975 | 7,627 | 9.34% |
| Juneau | 21,037 | 3,439 | 21,650 | 2.91% | 9,938 | 11,422 | 14.93% |
| Marquette | 11,672 | 0 | 12,321 | 5.56% | 7,128 | 8,035 | 12.72% |
| Menominee | 3,373 | 0 | 3,890 | 15.32% | 1,327 | 1,742 | 31.27% |
| Monroe | 35,074 | 15,358 | 36,633 | 4.44% | 12,741 | 14,135 | 10.94% |
| Oconto | 28,947 | 7,058 | 30,266 | 4.41% | 23,157 | 25,173 | 8.7% |
| Outagamie | 128,730 | 102,158 | 140,510 | 9.15% | 43,930 | 51,923 | 18.19% |
| Polk | 32,351 | 2,657 | 34,773 | 7.48% | 16,228 | 18,562 | 14.38% |
| Portage | 57,420 | 31,182 | 61,405 | 6.94% | 19,901 | 22,910 | 15.11% |
| Shawano | 35,928 | 7,598 | 37,157 | 3.42% | 15,246 | 16,737 | 9.77% |
| Washburn | 13,174 | 0 | 13,772 | 4.53% | 8,716 | 9,829 | 12.76% |
| Waupaca | 42,831 | 14,629 | 46,104 | 7.64% | 18,142 | 20,141 | 11.01% |
| Waushara | 18,526 | 81 | 19,385 | 4.63% | 11,242 | 12,246 | 8.93% |
| Wood | 72,799 | 39,676 | 73,605 | 1.1% | 26,186 | 28,839 | 10.13% |

## Table 4.6. Population Age and Education in the Documented Karner Blue Butterfly Range (U.S. Census of Population and Housing)

| | Age | | Education | |
|---|---|---|---|---|
| **Counties** | **Median** | **% 50 or Older** | **% High School Diploma** | **% College Degree** |
| Adams | 40.2 | 38.4 | 67.0 | 12.4 |
| Barron | 34.5 | 30.1 | 73.0 | 19.4 |
| Burnett | 39.2 | 37.4 | 72.3 | 13.7 |
| Chippewa | 33.4 | 27.4 | 75.0 | 18.2 |
| Clark | 33.9 | 30.6 | 67.5 | 13.9 |
| Dunn | 28.5 | 22.8 | 77.7 | 26.3 |
| Eau Claire | 30.3 | 23.5 | 82.8 | 29.9 |
| Green Lake | 36.8 | 33.7 | 74.6 | 17.3 |
| Jackson | 35.5 | 31.3 | 68.8 | 15.3 |
| Juneau | 35.5 | 32.7 | 70.6 | 14.4 |
| Marquette | 39.1 | 38.2 | 69.7 | 14.0 |
| Menominee | 24.5 | 20.0 | 62.7 | 7.3 |
| Monroe | 33.7 | 28.0 | 75.7 | 17.4 |
| Oconto | 35.0 | 30.9 | 69.4 | 13.4 |
| Outagamie | 31.4 | 23.1 | 81.5 | 24.9 |
| Polk | 34.6 | 29.2 | 78.0 | 18.6 |
| Portage | 29.3 | 21.2 | 79.7 | 24.6 |
| Shawano | 35.3 | 32.4 | 69.5 | 14.8 |
| Waupaca | 35.0 | 30.9 | 72.1 | 16.6 |
| Waushara | 38.6 | 36.2 | 70.0 | 15.1 |
| Wood | 33.3 | 27.3 | 78.3 | 21.7 |
| State of Wisconsin | 32.9 | 26.2 | 78.6 | 21.7 |

**Age and Education.** The age structure for the counties in the Karner blue butterfly documented range varies considerably (see Table 4.6, page 266). With the exception of Menominee County, however, the most rural counties have the highest median age and the highest percentage of elders (persons over 65) in the population. The inverse is not seen with the urban areas. Menominee, the most rural county, has both the lowest median age and the smallest percentage of elders. Of the other counties with a low median age and younger population, only Portage was one of the five top urban counties.

Educational attainment of the population in the documented range more closely follows urban/ rural divides (see Table 4.6, page 266). For the most part, those counties with the highest percentage of high school and college graduates are also the most urban. Eau Claire, Outagamie and Portage counties are in the top five for both percentage of high school and college graduates. Likewise, there is an obvious nexus between the rural counties and lower educational attainment. In both the percentage of high school and college graduates, Menominee and Adams counties rank the lowest and next lowest, respectively.

**Housing Units.** During that same period, the number of housing units in each of these counties increased significantly more than the population. In some instances, the percent increase in housing units was more than triple the percent change in population. For instance, in Juneau County population increased by 2.9 percent, while the number of housing units increased by nearly 15 percent. Menominee County had the largest relative change in the number of housing units, increasing 31.3 percent; it had, however, by far the lowest base number of units, making small numerical changes appear more significant. Not surprisingly, Outagamie County added the largest total number of housing units, with 7,993 new units in the ten year period. Housing statistics for the Karner blue butterfly documented range are summarized in Table 4.7 (page 268).

## 2. Socio-Economic Patterns

This section describes current patterns in the socio-economic makeup of the counties within the Karner blue butterfly documented range. Information for this section was primarily drawn from the *1990 Census of the Population and Housing* and the *1993 County Business Patterns*, both from the U.S. Department of Commerce.

The level of socio-economic strength also reflects the disparities among urban and rural counties in the documented range. As seen in Table 4.8 (page 269), urban counties have consistently higher median household and per capita income. Outagamie County had the highest of both, with a median income of $33,770 and a per capita income of $13,893. It was followed by Wood, Portage and Eau Claire counties, respectively. The lowest of both income measures was Menominee County, with a median income of $14,122 and a per capita income of $5,674. Other rural counties followed Menominee with low income standing; these were Burnett, Clark and Jackson counties, respectively.

## Table 4.7. Housing in the Documented Karner Blue Butterfly Range (U.S. Census of Population and Housing)

| Housing | | | | | |
|---|---|---|---|---|---|
| **Counties** | **Household Size** | **% Built Before 1969** | **Owner Occupied** | **Total Units** | **% Owner Occupied** |
| Adams | 2.44 | 17.2% | 4,859 | 12,418 | 39% |
| Barron | 2.60 | 26.1% | 11,345 | 19,363 | 58% |
| Burnett | 2.45 | 23.0% | 4,232 | 11,743 | 36% |
| Chippewa | 2.68 | 31.7% | 14,163 | 21,024 | 67% |
| Clark | 2.77 | 32.1% | 8,827 | 12,904 | 68% |
| Dunn | 2.69 | 26.6% | 8,234 | 13,252 | 62% |
| Eau Claire | 2.58 | 26.9% | 20,162 | 32,741 | 62% |
| Green Lake | 2.56 | 33.9% | 5,399 | 9,202 | 59% |
| Jackson | 2.59 | 31.6% | 4,547 | 7,627 | 60% |
| Juneau | 2.59 | 26.2% | 6,275 | 11,422 | 55% |
| Marquette | 2.52 | 24.5% | 3,893 | 8,035 | 49% |
| Menominee | 3.57 | 18.0% | 695 | 1,742 | 40% |
| Monroe | 2.70 | 28.1% | 9,571 | 14,135 | 68% |
| Oconto | 2.65 | 27.3% | 9,204 | 25,173 | 37% |
| Outagamie | 2.73 | 28.3% | 36,507 | 51,923 | 70% |
| Polk | 2.62 | 21.8% | 10,165 | 18,562 | 55% |
| Portage | 2.71 | 26.9% | 14,984 | 22,910 | 65% |
| Shawano | 2.64 | 31.8% | 10,614 | 16,737 | 63% |
| Waupaca | 2.62 | 27.5% | 12,961 | 20,141 | 64% |
| Waushara | 2.52 | 24.7% | 6,116 | 12,246 | 50% |
| Wood | 2.65 | 32.1% | 20,127 | 28,839 | 70% |
| State of WI | 2.61 | 29.3% | 1,215,324 | 2,055,774 | 59% |

## Table 4.8. Income, Employment and Commuting Patterns in the Documented Karner Blue Range (U.S. Census of Population and Housing)

| County | Income | | Empl. and Commuting | |
|---|---|---|---|---|
| | Per Capita | Median | Unempl. | Driving |
| Adams | 10,926 | 21,548 | 10.6% | 88.2% |
| Barron | 10,377 | 22,570 | 6.5% | 80.8% |
| Burnett | 9,623 | 20,153 | 8.5% | 82% |
| Chippewa | 11,170 | 25,858 | 6.2% | 84.5% |
| Clark | 9,810 | 22,177 | 5.2% | 70.9% |
| Dunn | 10,364 | 24,452 | 6.3% | 76.2% |
| Eau Claire | 11,801 | 25,886 | 6.3% | 85% |
| Green Lake | 11,840 | 25,708 | 6.1% | 81.7% |
| Jackson | 10,173 | 21,409 | 7.7% | 80.3% |
| Juneau | 10,304 | 22,073 | 6.6% | 83.2% |
| Marquette | 10,652 | 22,234 | 5.9% | 83.9% |
| Menominee | 5,674 | 14,122 | 20.7% | 88.8% |
| Monroe | 10,744 | 24,799 | 4.7% | 81.0% |
| Oconto | 10,375 | 22,927 | 7.3% | 83.2% |
| Outagamie | 13,893 | 33,770 | 4.0% | 88.9% |
| Polk | 11,291 | 24,267 | 6.7% | 81.2% |
| Portage | 11,730 | 28,686 | 5.0% | 84.0% |
| Shawano | 10,586 | 23,841 | 6.0% | 81.0% |
| Waupaca | 11,455 | 26,083 | 5.5% | 84.8% |
| Waushara | 10,408 | 21,888 | 7.2% | 83.9% |
| Wood | 13,130 | 29,735 | 6.1% | 88.4% |
| State of Wisconsin | 13,276 | 29,716 | 5.2% | 86.0% |

Contrasts between the urban and rural counties are also seen in home ownership patterns. As with unemployment, home ownership tendencies modeled fairly closely those of median household income. Generally, as median income increased, there was a corresponding increase in home ownership. Burnett, Oconto, Adams and Menominee counties showed the lowest rates of home ownership, while Outagamie, Portage and Wood were among the highest. The instance of home ownership in Outagamie County almost doubled that of Burnett County; this illustrates the latitude between the high and low ends of the spectrum.

Predictably, unemployment rates for counties within the Karner blue butterfly documented range were highest in those rural counties with the lowest income (see Table 4.8, page 269). According to the Census of Population and Housing by the U.S. Department of Commerce, Menominee County had the highest unemployment rate at 20.7 percent, contrasting a 4.0 percent rate in Outagamie County. Despite this broad range in unemployment rates, the twenty-one counties that are the Karner blue butterfly documented range, taken in their entirety, have a higher instance of unemployment than the state average. Only three counties, Outagamie, Portage and Clark, have an unemployment rate that is equal to or below the state level of 5.2 percent.

**Employment structures.** In their industrial sectors, the rural counties tended to be predominantly manufacturing in their employment structure; counties that were more urban were inclined toward services and retail as their major employers. According to the 1993 County Business Patterns report, employment in the most rural counties, Menominee and Marquette, was heavily dominated by the manufacturing sector. Outagamie, Portage and Wood Counties were fairly well balanced in the different employment sectors, but Portage and Wood were still topped by service and retail.

## D. Land Use

This section presents possible implications of the population and socio-economic trends and provides information on other land use-related issues. New information in this section is drawn from land record information from the Wisconsin Department of Revenue. As mentioned in Part A of Chapter II (page 44), land use decisions are a function of existing or anticipated demographic, economic, agricultural, social, cultural and natural conditions. The preceding sections provide a basis for discussing implications and trends in land use.

**Population, Housing and Employment.** The trends outlined for population growth, housing and employment indicate that land development pressures on those counties that are more urban is likely to continue. With lower unemployment rates and higher median incomes in the urban counties, some continued migration would be expected from the rural areas. Furthermore, the significantly higher rate of growth for housing development relative to population is likely to require greater land conversion in those areas with increasing populations.

**Land Conversion.** When evaluating land use trends, particularly with regard to conservation issues,

the rate of land conversion is highly salient. Land conversion rates in the Karner blue butterfly documented range are presented in Table 4.9 (page 273). Land conversion records from the Department of Revenue were reviewed for the three most urban counties in the Karner blue butterfly range: Eau Claire, Portage and Wood. For the period 1990 through 1995, a total of 37,586 acres in the three counties were converted from rural land uses, such as agriculture, forest and wetlands. With nearly 15,000 acres converted during that period, Wood County showed the highest acreage changing land use. In Portage and Wood Counties, rural land conversion was at its height for this period in 1994, while land conversion in Eau Claire County was significantly higher in 1995 than in other years. From 1991 to 1995, there appeared to be no clear trend of increase or decrease in land conversion, but rather, it varied inconsistently.

For comparison, land conversion rates in the three most rural counties in the range, Burnett, Marquette and Menominee, were also examined. They were, however, not much lower. In fact, Burnett County exceeded Wood County in land conversion with about 15,500 acres of rural land being diverted to other uses (Table 4.9, page 273). In Burnett County, much of the land conversion may be attributed to recreational and second home development for nonresident land owners.

From the data, it is difficult to form a clear understanding of what is happening in land conversion. Although most of the population growth is directed near urban areas, land conversion is occurring at a similar rate in rural areas.

**Property Values.** Trends in property values vary considerable from county to county, particularly rural to urban. For instance, agricultural land changing use in Burnett County in 1996 averaged $282 per acre; whereas agricultural land being converted in Eau Claire County for the same year had a mean value of $937 per acre. Clearly, there is notably more incentive for a farmer in Eau Claire County to turn over his land to other uses. Nonetheless, the rates of land conversion are not commensurately higher.

There are two key implications that property values might have on development and land use. The first is that, given the high return per acre, agricultural land owners are more likely to sell land in the counties that are more urbanized. With the higher value per acre, the farmer has a strong incentive to sell or develop his land. Second, in order to get lower, more competitive prices, new residential development will be more inclined to be located further on the periphery of urban centers. Thus, this incites residents to commute further for more economical but less efficient use of land.

**Transportation (as it relates to land use and planning).** The highway system for the central portions of Wisconsin went through rapid growth from the 1950's through the 1970's; now at a stable period, relatively little new acreage will be required in the foreseeable future. Almost all future work needed by state, county and township road systems will occur on existing rights-of-way. If full state and federal funding is received, almost 1,000 acres of the 10.6 million acres in the Karner blue butterfly documented range will be converted for state transportation uses within the next five to seven years. Most of this additional land would be used to convert current two lane roads to four lane

expressways near the existing cities of Elk Mound, Waupaca, Plover and Wisconsin Rapids. Local streets and subdivision roads will also be needed, but the extent of this is unknown. Other forms of transportation, such as railways and airports, are also stable and will require little additional land.

## Table 4.9. Average Rural Land Conversion for 1990-1995 in the Documented Karner Blue Range (Based on Wisconsin Department of Revenue Figures)

| | Mean Value per Acre | | Number of Acres Changing Use | | |
|---|---|---|---|---|---|
| **County** | **Converted** | **Retained** | **Agriculture** | **Other Rural Uses** | **Total** |
| Adams | 366.80 | 338.70 | 2,921 | 5,783 | 8,704 |
| Barron | 219.20 | 182.70 | 12,769 | 9,813 | 22,582 |
| Burnett | 164.50 | 155.70 | 4,548 | 11,227 | 15,775 |
| Chippewa | 203.00 | 170.00 | 9,206 | 10,388 | 19,594 |
| Clark | 151.00 | 175.70 | 10,358 | 8,225 | 18,583 |
| Dunn | 206.50 | 203.80 | 9,268 | 7,012 | 16,280 |
| Eau Claire | 309.20 | 204.80 | 6,065 | 5,443 | 11,508 |
| Green Lake | 345.50 | 371.70 | 2,462 | 1,586 | 4,048 |
| Jackson | 259.50 | 242.30 | 3,386 | 13,316 | 16,702 |
| Juneau | 299.80 | 254.50 | 5,644 | 8,937 | 14,581 |
| Marinette | 223.70 | 216.30 | 6,207 | 15,333 | 21,540 |
| Marquette | 250.00 | 262.50 | 5,041 | 3,742 | 8,783 |
| Menominee | Information not available | | | | |
| Monroe | 365.00 | 268.50 | 3,994 | 8,978 | 12,972 |
| Oconto | 254.30 | 220.5 | 6,193 | 5,710 | 11,903 |
| Outagamie | 1030.50 | 462.70 | 7,000 | 1,902 | 8,902 |
| Polk | 256.30 | 192.20 | 13,427 | 12,524 | 25,951 |
| Portage | 377.50 | 331.50 | 6,083 | 5,055 | 11,138 |
| St. Croix | 589.50 | 432.30 | 16,045 | 4,724 | 20,769 |
| Sawyer | 225.30 | 148.30 | 3,052 | 24,291 | 27,343 |
| Shawano | 280.30 | 231.20 | 6,885 | 6,334 | 13,219 |
| Washburn | 155.00 | 150.70 | 4,938 | 18,130 | 23,068 |
| Waupaca | 346.50 | 293.80 | 8,698 | 6,524 | 15,222 |
| Waushara | 332.50 | 298.70 | 7,502 | 5,855 | 13,357 |
| Wood | 318.70 | 238.00 | 8,522 | 6,418 | 14,940 |

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